



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent 768 BYPASS RATIO (-): 5.2
 UNIQUE ID NUMBER: 01P14RR101 PRESSURE RATIO π_{oo} (-): 34.5
 COMBUSTOR: Phase5
 ENGINE TYPE: MTF RATED OUTPUT F_{oo} (kN): 304.3

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{oo} (mg/kN)	LTO_{num}/F_{oo} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{oo} AND MAX $nvPM_{mass}$	207.4	2.14E+15	482
AS % OF CAEP/10 LIMIT	-	-	12.0
AS % OF CAEP/11 LIMIT (InP)	59.7	51.3	
AS % OF CAEP/11 LIMIT (NT)	96.9	76.9	

MEASURED DATA

MODE	POWER SETTING (% F_{oo})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK $nvPM_{mass}$ ($\mu\text{g}/\text{m}^3$)
				EI_{mass} (mg/kg)	EI_{num} (particles/kg)	
TAKE-OFF	100	0.7	2.907	84.7	2.97E+14	
CLIMB OUT	85	2.2	2.375	97.1	4.38E+14	
APPROACH	30	4.0	0.781	15.2	3.90E+14	
IDLE	7	26.0	0.259	4.3	5.48E+14	
LTO TOTAL (kg, mg, number of particles)			1027	45395	4.68E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				149.2	1.54E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				96.8	5.48E+14	374

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{oo})	CORRECTED EMISSIONS INDICES	
		$EI_{mass_{SL}}$ (mg/kg)	$EI_{num_{SL}}$ (particles/kg)
TAKE-OFF	100	90.8	4.18E+14
CLIMB OUT	85	105.2	6.55E+14
APPROACH	30	18.1	8.53E+14
IDLE	7	6.5	2.08E+15

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	101.0	101.3	HEAT OF COMBUSTION (MJ/kg)	43.10
TEMPERATURE (K)	289.3	293.2	HYDROGEN CONTENT (%mass)	13.60
HUMIDITY (kg water/kg dry air)	0.0074	0.0086	AROMATICS CONTENT (%vol)	19.4
			NAPHTHALENE CONTENT (%vol)	2.00
			SULPHUR CONTENT (ppm by mass)	400

MANUFACTURER: Rolls-Royce plc
 TEST ORGANIZATION: Rolls-Royce plc
 TEST LOCATION: Derby
 TEST DATES: 02/06/2014

REMARKS

1. Certification Report EDNS01000788666
2. The maximum EI_{mass} occurs between 30% and 85% F_{oo}
3. The maximum EI_{num} occurs between 30% and 85% F_{oo}
4. Corrected peak EI number value (fuel correction) since EEDB v30